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optical power of a WDM optical signal in a longer-wavelength band among a plurality of WDM optical signals in respective wavelength bands; and

inputting said plurality of WDM optical signals in the respective wavelength bands to an optical transmission line.

REMARKS

Reconsideration and allowance of the above-referenced application are respectfully requested.

I. STATUS OF THE CLAIMS

Claims 37-41 are amended herein without narrowing the claims.

In view of the above, it is respectfully submitted that claims 1-41 are currently pending and under consideration.

II. REJECTION OF CLAIMS 1, 3, 5, 14 AND 15 UNDER 35 U.S.C. § 103(A) AS OBVIOUS OVER MA ET AL. IN VIEW OF BERGER

The present invention as recited, for example, in claim 1 relates to an optical amplifying apparatus comprising "wavelength multiplexing means for wavelength multiplexing outputs of said respective optical adjusting means" and "controlling means for performing control so that an output of optical adjusting means for adjusting optical power of shorter wavelength band light among said plurality of optical adjusting means becomes larger than an output of optical adjusting means for adjusting optical power of longer wavelength band light among said plurality of optical adjusting means."

Ma discloses transmitters 200, 214 and 216 transmitting optical communications channels at their respective wavelengths. Ma also discloses a multiplexer 210 to multiplex the respective wavelength signals. In Fig. 4, Ma discloses, for example, a wavelength router 303 placed at the downstream of an amplifier 302, a wavelength router 305 placed at the downstream of the wavelength router 303, and a plurality of fibers 304_1- 304_N which are each provided with one of a plurality of optical amplifiers 308_1- 308_N in between the wavelength routers 303 and 305.

The Examiner states that Ma fails to teach the claimed controlling means. Therefore, Ma does not teach or suggest the features as recited in claim 1 of the present application.

Berger discloses an amplifier arranged to offset Raman gain. More specifically, for

example, Berger discloses signals output by transmitters 110-1 through 110-N that are combined (multiplexed) at MUX 120 and then outputted to optical transmission line 130 via optical amplifier 100-1. The combined optical signals are then transported via amplifiers 100-2 through 100-k-1 and optical cables 130 to DEMUX 140 via optical amplifier 100-k. DEMUX 140 separates the combined signals from one another and supplies the separated signals to respective ones of the receivers 150-1 through 150-M, where M equals N. See column 2, line 60- column 3, line 2 of Berger.

As shown in Fig. 4, Berger further discloses an amplifier 100-i (representing amplifiers 100-1 through 100-k) positioned on a single optical transmission line 130 and receiving multiplexed optical signals via signal coupler 1 and optical isolator device 5. The multiplexed optical signals received via the optical isolator device 5 are transmitted to variable attenuator unit (VAU) 30 via the wavelength division multiplier (WDM) 15 and isolator 20. The multiplexed optical signals received via the signal coupler 1 are supplied to controller 75 by a photodetector 25 and A/D converter 60 as a digital value indicating the electric power level. Then, adjustment on the level of optical signals passing through the VAU 30 is performed. The optical signals are thereby supplied from the signal splitter 80 to the single optical transmission line 130 via the output stage consisting of WDM 40, rare-earth doped fiber 45, and isolator 50.

Berger does not teach that the outputs of optical adjusting means are controlled before the outputs of the optical adjusting means are wavelength multiplexed as recited, for example, in claim 1 of the present application. Also, in the present application, the optical powers on respective wavelengths are adjusted individually and directly. Moreover, for example, the optical powers on respective wavelengths are adjusted individually in each of the plurality of optical adjusting means (e.g., optical amplifiers) at the upstream of the wavelength-multiplexing means, according to detection from the optical transmission line at the downstream of the wavelength-multiplexing means (see Figs. 6 and 7 of the Applicant's specification). Berger does not adjust power levels on wavelengths individually. Berger also performs control of the optical amplifiers based on **multiplexed** optical signals, which differs from the claimed controlling means that performs control of the outputs of the optical adjusting means before the outputs of the optical adjusting means are wavelength multiplexed as recited, for example, in claim 1. Therefore, Berger does not teach or suggest the features as recited in claim 1 of the present application.

In light of the above, Ma and Berger, either alone or in combination, do not teach or suggest the features as recited in claim 1 of the present application.

Independent claim 37 sets forth somewhat similar features as recited, for example, in claim 1. For example, claim 37 recites "amplifying light in a shorter-wavelength band among said plurality of wavelength bands so that it will have optical power that is larger than optical power of the amplified light in the longer-wavelength band" and "wavelength-multiplexing light beams of the plurality of wavelength bands," which distinguishes over the cited prior art.

Claims 3, 5, 14, and 15 depend from claim 1. Therefore, for at least the reasons that claim 1 distinguishes over the cited prior art, it is respectfully submitted that claims 3, 5, 14, and 15 also distinguish over the cited prior art.

In view of the above, it is respectfully submitted that the rejection is overcome.

III. REJECTION OF CLAIMS 16, 17, 26, 27, 28, 29, 30, 32, 35, 36, 39, 41 UNDER 35 U.S.C. § 103(A) AS BEING ANTICIPATED BY IWATA ET AL. IN VIEW OF BERGER ET AL.

The present invention as recited, for example, in claim 16 relates to an optical sending apparatus comprising "controlling means for performing control so that an output of optical adjusting means for adjusting optical power of shorter wavelength band light among said plurality of optical adjusting means becomes larger than an output of optical adjusting means for adjusting optical power of longer wavelength band light among said plurality of optical adjusting means."

Iwata discloses a signal light outputting apparatus performing the control of powers and/or wavelengths of signal lights of different wavelengths to be wavelength multiplexed and transmitted. More specifically, for example, Iwata discloses that the signal lights can be transmitted and received accurately while making transmission characteristics of the signal lights equal to each other.

The Examiner states that Iwata does not explicitly disclose the claimed controlling means. Therefore, Iwata does not teach or suggest the features as recited, for example, in claim 16 of the present application.

The comments in section II, above, in regard to the teachings of Berger, also apply here. Accordingly, Berger also does not teach or suggest the features as recited in claim 16 of the present application.

Therefore, Iwata and Berger, either alone or in combination, do not teach or suggest the features as recited in claim 16 of the present application.

Independent claim 29 sets forth similar features as recited, for example, in claim 16. Therefore, Iwata and Berger do not teach or suggest the features as recited in claim 29 of the present application.

Independent claim 39 recites "amplifying a WDM optical signal in a longer-wavelength band among the plurality of WDM optical signals," "amplifying a WDM optical signal in a shorter-wavelength band among said plurality of WDM optical signals so that it will have optical power that is larger than optical power of the amplified WDM optical signal in said longer-wavelength band," and "wavelength-multiplexing said plurality of WDM optical signals," and therefore patentably distinguishes over the prior art. Claim 41 recites "making optical power of a WDM optical signal in a shorter-wavelength band larger than optical power of a WDM optical signal in a longer-wavelength band among a plurality of WDM optical signals in respective wavelength bands," and therefore patentably distinguishes over the prior art.

Claims 17 and 26-28 depend from claim 16. Claims 30, 32, 35, and 36 depend from claim 29. Therefore, for at least the reasons that claims 16 and 29 distinguish over the cited prior art, it is respectfully submitted that claims 17, 26-28, 30, 32, 35, and 36 also distinguish over the cited prior art.

In view of the above, it is respectfully submitted that the rejection is overcome.

IV. REJECTIONS OF CLAIMS 2, 4, 6-13, 18-25, 31, 33, 34, 38, AND 40 OVER THE COMBINATIONS OF MA ET AL., BERGER ET AL., ISHIKAWA, TOYOHARA, ITOU, IWATA, AND TAGA

Claims 2, 4, 6-13, 18-25, 31, 33, 34, 38, and 40 depend from independent claims 1, 16, 29, 37, 39, or 41, either indirectly or directly. Therefore, for at least the reasons that independent claims 1, 16, 29, 37, 39, and 41 distinguish over the cited prior art, it is respectfully submitted that claims 2, 4, 6-13, 18-25, 31, 33, 34, 38, and 40 also distinguish over the cited prior art.

In view of the above, it is respectfully submitted that the rejections to claims 2, 4, 6-13, 18-25, 31, 33, 34, 38, and 40 are overcome.

V. CONCLUSION

In view of the foregoing amendments and remarks, it is respectfully submitted that each of the claims patentably distinguishes over the prior art, and therefore defines allowable subject matter. A prompt and favorable reconsideration of the rejection along with an indication of allowability of all pending claims are therefore respectfully requested.

If there are any additional fees associated with filing of this Amendment, please charge the same to our Deposit Account No. 19-3935.

Respectfully submitted,

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VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE CLAIMS:

Please AMEND the following claims:

1. (AS UNAMENDED) An optical amplifying apparatus comprising:

a plurality of optical adjusting means provided for respective wavelength bands, for adjusting optical powers of light beams;

wavelength-multiplexing means for wavelength multiplexing outputs of said respective optical adjusting means; and

controlling means for performing control so that an output of optical adjusting means for adjusting optical power of shorter-wavelength-band light among said plurality of optical adjusting means becomes larger than an output of optical adjusting means for adjusting optical power of longer-wavelength-band light among said plurality of optical adjusting means.

2. (AS UNAMENDED) The optical amplifying apparatus according to claim 1, further comprising:

wavelength-demultiplexing means for wavelength-demultiplexing input light into light beams in respective wavelength bands; and

outputting each of the light beams in the respective wavelength bands to said respective optical adjusting means.

3. (AS UNAMENDED) The optical amplifying apparatus according to claim 1, wherein said controlling means further controls the outputs of said respective optical adjusting means so that optical powers of the respective wavelength bands at a predetermined point will become approximately identical when output light of the wavelength-multiplexing means travels to the predetermined point.

4. (AS UNAMENDED) The optical amplifying apparatus according to claim 1, wherein said controlling means further controls the outputs of said respective optical adjusting means so that powers obtained by eliminating noise powers in the respective optical adjusting means from optical powers of said respective wavelength bands at a predetermined point will become approximately identical when output light of the wavelength-multiplexing means travels

to the predetermined point.

5. (AS UNAMENDED) The optical amplifying apparatus according to claim 1, further comprising a light source for supplying light to respective input light beams of said plurality of optical adjusting means.

6. (AS UNAMENDED) The optical amplifying apparatus according to claim 2, further comprising an optical transmission line connected to said wavelength-demultiplexing means for transmitting said input light, and a light source for supplying light to said optical transmission line.

7. (AS UNAMENDED) The optical amplifying apparatus according to claim 2, wherein said controlling means determines a difference between the output of said optical adjusting means for adjusting the optical power of said shorter-wavelength-band light and the output of said optical adjusting means for adjusting the optical power of said longer-wavelength-band light based on at least one of stimulated Raman scattering in an optical transmission line connected to an output side of said optical amplifying apparatus, a loss in said optical transmission line, a loss in said wavelength-demultiplexing means, and a loss in said wavelength-multiplexing means.

8. (AS UNAMENDED) The optical amplifying apparatus according to claim 1, wherein said light beams are a WDM optical signal in a first wavelength band and a WDM optical signal in a second wavelength band having longer wavelength than the first wavelength band, and wherein the number of channels of the WDM optical signal in the first wavelength band is increased or decreased.

9. (AS UNAMENDED) The optical amplifying apparatus according to claim 1, wherein said light beams are a WDM optical signal in a first wavelength band and a WDM optical signal in a second wavelength band having longer wavelength than the first wavelength band, and wherein the number of channels of the WDM optical signal in the second wavelength band is increased or decreased.

10. (AS UNAMENDED) The optical amplifying apparatus according to claim 3,

further comprising detecting means for detecting said optical powers of said respective wavelength bands at said predetermined point, wherein

said controlling means further controls the outputs of said respective optical adjusting means based on an output of the detecting means.

11. (AS UNAMENDED) The optical amplifying apparatus according to claim 4, further comprising detecting means for detecting said optical powers of said respective wavelength bands at said predetermined point, wherein

said controlling means further controls the outputs of said respective optical adjusting means based on an output of said detecting means.

12. (AS UNAMENDED) The optical amplifying apparatus according to claim 10, wherein said light beams are WDM optical signals, and wherein

said detecting means detects optical power of one of the WDM optical signals that corresponds to a shortest-wavelength channel.

13. (AS UNAMENDED) The optical amplifying apparatus according to claim 11, wherein said light beams are WDM optical signals, and wherein

said detecting means detects optical power of one of the WDM optical signals that corresponds to a shortest-wavelength channel.

14. (AS UNAMENDED) The optical amplifying apparatus according to claim 1, wherein said plurality of optical adjusting means are optical amplifiers for amplifying said light beams.

15. (AS UNAMENDED) The optical amplifying apparatus according to claim 1, wherein said plurality of optical adjusting means are optical attenuators for attenuating said light beams.

16. (AS UNAMENDED) An optical sending apparatus comprising:

a plurality of optical sending means provided for each predetermined wavelength band, and for generating WDM optical signals in the respective wavelength bands;

a plurality of optical adjusting means connected to said respective optical sending

means, for adjusting optical powers of light beams;

wavelength-multiplexing means for wavelength-multiplexing outputs of said respective optical adjusting means; and

controlling means for performing control so that an output of optical adjusting means for adjusting optical power of shorter-wavelength-band light among said plurality of optical adjusting means becomes larger than an output of optical adjusting means for adjusting optical power of longer-wavelength-band light among said plurality of optical adjusting means.

17. (AS UNAMENDED) The optical sending apparatus according to claim 16, wherein said controlling means further controls the outputs of said respective optical adjusting means so that optical powers of the respective wavelength bands at a predetermined point will become approximately identical when output light of said wavelength-multiplexing means travels to the predetermined point.

18. (AS UNAMENDED) The optical sending apparatus according to claim 16, wherein said controlling means further controls the outputs of said respective optical adjusting means so that powers obtained by eliminating noise powers in said respective optical adjusting means from optical powers of the respective wavelength bands at a predetermined point will become approximately identical when output light of said wavelength-multiplexing means travels to the predetermined point.

19. (AS UNAMENDED) The optical sending apparatus according to claim 16, wherein said controlling means determines a difference between the output of said optical adjusting means for adjusting the optical power of said shorter-wavelength-band light and the output of said optical adjusting means for adjusting the optical power of said longer-wavelength-band light based on at least one of stimulated Raman scattering in an optical transmission line connected to an output side of said optical sending apparatus, a loss in said optical transmission line, and a loss in said wavelength-multiplexing means.

20. (AS UNAMENDED) The optical sending apparatus according to claim 16, wherein said WDM optical signals in the respective wavelength bands are a WDM optical signal in a first wavelength band and a WDM optical signal in a second wavelength band having longer wavelengths than the first wavelength band, and wherein

the number of channels of said WDM optical signal in the first wavelength band is increased or decreased.

21. (AS UNAMENDED) The optical sending apparatus according to claim 16, wherein said WDM optical signals in the respective wavelength bands are a WDM optical signal in a first wavelength band and a WDM optical signal in a second wavelength band having longer wavelengths than the first wavelength band, and wherein the number of channels of said WDM optical signal in the second wavelength band is increased or decreased.

22. (AS UNAMENDED) The optical sending apparatus according to claim 17, further comprising detecting means for detecting said optical powers of said respective wavelength bands at said predetermined point, wherein

said controlling means further controls the outputs of said respective optical adjusting means based on an output of said detecting means.

23. (AS UNAMENDED) The optical sending apparatus according to claim 18, further comprising detecting means for detecting one of said optical powers of said respective wavelength bands at said predetermined point, wherein

said controlling means further controls the outputs of said respective optical adjusting means based on an output of said detecting means.

24. (AS UNAMENDED) The optical sending apparatus according to claim 22, wherein said detecting means detects optical power of one of the WDM optical signals that corresponds to a shortest-wavelength channel.

25. (AS UNAMENDED) The optical sending apparatus according to claim 23, wherein said detecting means detects optical power of one of the WDM optical signals that corresponds to a shortest-wavelength channel.

26. (AS UNAMENDED) The optical sending apparatus according to claim 16, wherein each of said plurality of optical sending means generates each WDM optical signal respectively in each of said plurality of wavelength bands by generating a plurality of optical signals having different optical powers and wavelength-multiplexing said plurality of optical

signals on a wavelength band basis.

27. (AS UNAMENDED) The optical sending apparatus according to claim 16, wherein said plurality of optical adjusting means are optical amplifiers for amplifying light beams.

28. (AS UNAMENDED) The optical sending apparatus according to claim 16, wherein said plurality of optical adjusting means are optical attenuators for attenuating light beams.

29. (AS UNAMENDED) An optical transmission system comprising:

an optical sending apparatus for generating an optical signal of a plurality of wavelength bands;

an optical transmission line for transmitting the generated said optical signal;

an optical receiving apparatus for receiving and processing said optical signal transmitted through said optical transmission line; and

at least one optical amplifying apparatus provided on the optical transmission line, comprising:

wavelength-demultiplexing means for wavelength-demultiplexing said optical signal on a wavelengt band basis;

a plurality of optical adjusting means for adjusting optical powers of each said optical signal in the respective wavelength bands, that are output from said wavelength-demultiplexing means;

wavelength-multiplexing means for wavelength-multiplexing outputs of said respective optical adjusting means; and

controlling means for performing control so that an output of optical adjusting means for adjusting optical power of shorter-wavelength-band light among said plurality of optical adjusting means becomes larger than an output of optical adjusting means for adjusting optical power of longer-wavelength-band light among said plurality of optical adjusting means.

30. (AS UNAMENDED) The optical transmission system according to claim 29, wherein said controlling means of said optical amplifying apparatus further controls the outputs of said respective optical adjusting means so that optical powers of the optical signals in the respective wavelength bands at a predetermined point will become approximately identical when

an output optical signal of said optical amplifying apparatus travels to the predetermined point.

31. (AS UNAMENDED) The optical transmission system according to claim 29, wherein said controlling means of said optical amplifying apparatus further controls the outputs of said respective optical adjusting means so that powers obtained by eliminating noise powers in said respective optical adjusting means from optical powers of the optical signals in said respective wavelength bands at a predetermined point will become approximately identical when an output optical signal of said optical amplifying apparatus travels to the predetermined point.

32. (AS UNAMENDED) The optical transmission system according to claim 29, wherein said optical amplifying apparatus further comprises a light source for supplying light to an optical transmission line through which an input optical signal is transmitted.

33. (AS UNAMENDED) The optical transmission system according to claim 29, wherein said optical sending apparatus generates said optical signal of said plurality of wavelength bands by generating said plurality of optical signals having different optical powers and wavelength-multiplexing the plurality of optical signals on a wavelength band basis.

34. (AS ONCE AMENDED) The optical transmission system according to claim 29, wherein said optical receiving apparatus comprises a spectrum detecting section for detecting a spectrum of the optical signal and outputting a result of said detection to the optical sending apparatus, and wherein

said optical sending apparatus generates said optical signal of said plurality of wavelength bands by generating sets of optical signals having different optical powers based on

the detection result of the spectrum detecting section and wavelength-multiplexing the sets of optical signals on a wavelength band basis.

35. (AS UNAMENDED) The optical transmission system according to claim 29, wherein said plurality of optical adjusting means of the optical amplifying apparatus are optical amplifiers for amplifying optical signals.

36. (AS UNAMENDED) The optical sending apparatus according to claim 29, wherein said plurality of optical adjusting means of the optical amplifying apparatus are optical

attenuators for attenuating optical signals.

37. (ONCE AMENDED) A method of amplifying light comprising [the steps of]:

[(1)]amplifying light in a longer-wavelength band among a plurality of wavelength bands;

[(2)]amplifying light in a shorter-wavelength band among said plurality of wavelength bands so that it will have optical power that is larger than optical power of the amplified light in the longer-wavelength band; and

[(3)]wavelength-multiplexing light beams of the plurality of wavelength bands.

38. (ONCE AMENDED) The optical amplifying method according to claim 37, further comprising [a step of] determining a difference between an amplification output of the light in said shorter-wavelength band and an amplification output of the light in said longer-wavelength band so that optical powers of the respective wavelength bands at a predetermined point will become approximately identical when wavelength-multiplexed light of the said plurality of wavelength bands travels to the predetermined point, and wherein

said [step (2)] <u>amplifying</u> amplifies said light in the shorter-wavelength band so that it will have optical power that is larger than optical power of amplified light in said longer-wavelength band by said difference.

39. (ONCE AMENDED) A method of amplifying light comprising [the steps of]:

[(1)]generating a plurality of optical signals having different optical powers;

[(2)]generating a plurality of WDM optical signals by wavelength-multiplexing said plurality of optical signals on a wavelength band basis;

[(3)]amplifying a WDM optical signal in a longer-wavelength band among the plurality of WDM optical signals;

[(4)]amplifying a WDM optical signal in a shorter-wavelength band among said plurality of WDM optical signals so that it will have optical power that is larger than optical power of the amplified WDM optical signal in said longer-wavelength band; and

[(5)]wavelength-multiplexing said plurality of WDM optical signals.

40. (ONCE AMENDED) The optical amplifying method according to claim 39, further comprising [a step of] determining a difference between an amplification output of the WDM optical signal in said shorter-wavelength band and an amplification output of the WDM optical

signal in said longer-wavelength band so that optical powers of the respective WDM optical signals at a predetermined point will become approximately identical when a wavelength-multiplexed optical signal of the plurality of WDM optical signals travels to the predetermined point, and wherein

said [step (4)] amplifying amplifies the WDM optical signal in said shorter-wavelength band so that it will have optical power that is larger than optical power of amplified light in the longer-wavelength band by said difference.

41. (ONCE AMENDED) A method of inputting light comprising [the steps of]:

making optical power of a WDM optical signal in a shorter-wavelength band larger than optical power of a WDM optical signal in a longer-wavelength band among a plurality of WDM optical signals in respective wavelength bands; and

inputting said plurality of WDM optical signals in the respective wavelength bands to an optical transmission line.